CAREER: Oxygen Ion Conduction in Layered Aurivillius-Derived Ceramics

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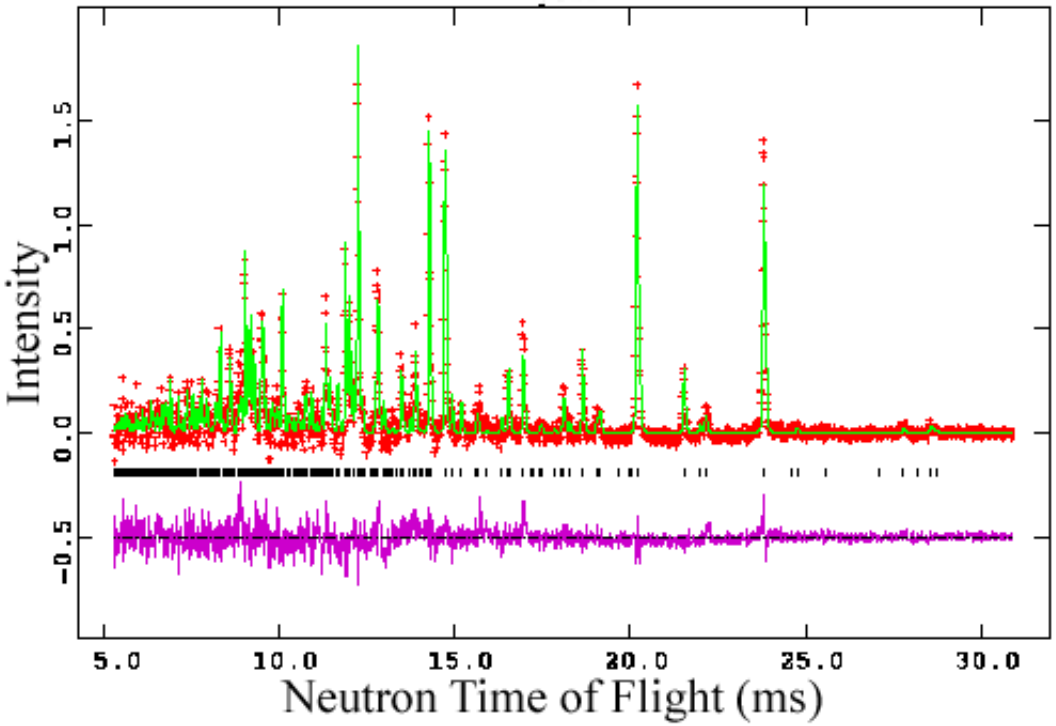
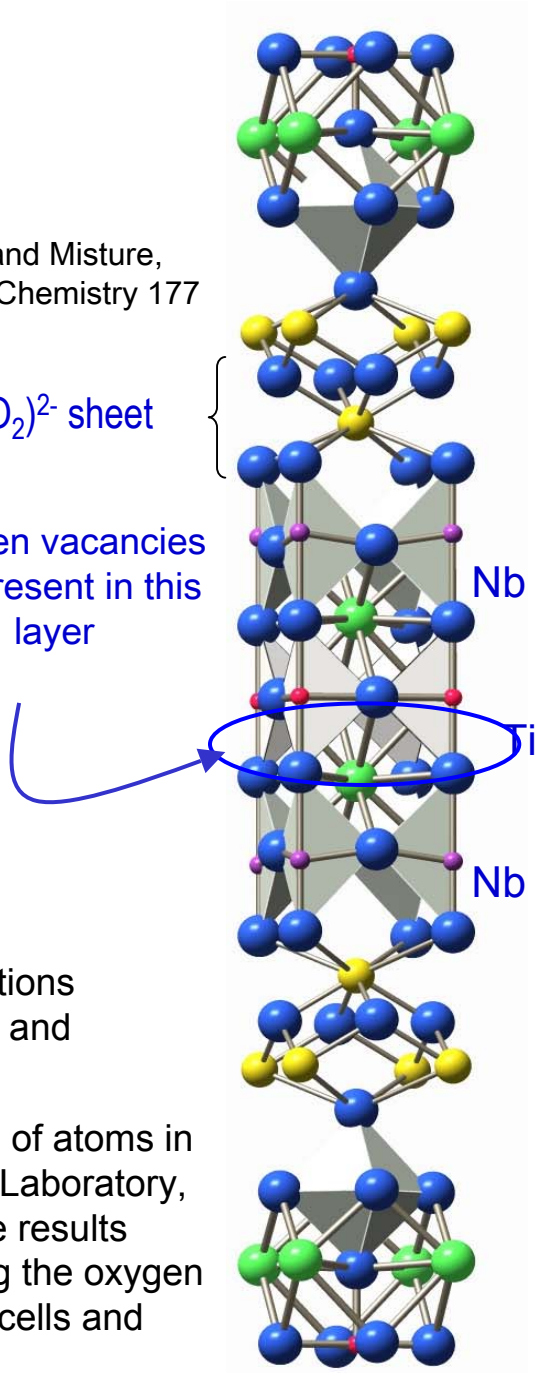


See Haluska and Misture, J. Solid State Chemistry 177 1965 (2004).



Ceramics with layered structures are under study for a wide range of applications including next-generation computer memory, solid oxide fuel cell electrolytes and cathodes, oxygen pumps, and catalysts.

Neutron diffraction is a critical tool for locating the atoms and the populations of atoms in crystalline materials. The data shown below, collected at Argonne National Laboratory, provide a new model of the structure of the Aurivillius class of materials. The results show that strains develop between the layers in the crystal structure, creating the oxygen vacancies that are critical for the practical application of the materials in fuel cells and related devices.

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A freshman ceramic engineer, along with an art student, designed a “What is Ceramics” kit that includes demonstrations of fiber optics, a piezoelectric buzzer, and a strength comparison between bone and SiC.

Along with the demonstration kit, which has been distributed by request to ~90 teachers and 5 companies, we have an extensive website. The website, **jobs.alfred.edu/~misture**, provides a full description of the demonstration kit as well as photographs of the scientific equipment used to study the materials. A large number of optical and electron microscope images are now integrated into the website, including:

- A dissection of a computer CPU
- Bone and bone replacement materials
- Piezoelectric buzzer
- An LED used in the fiber optic demonstration